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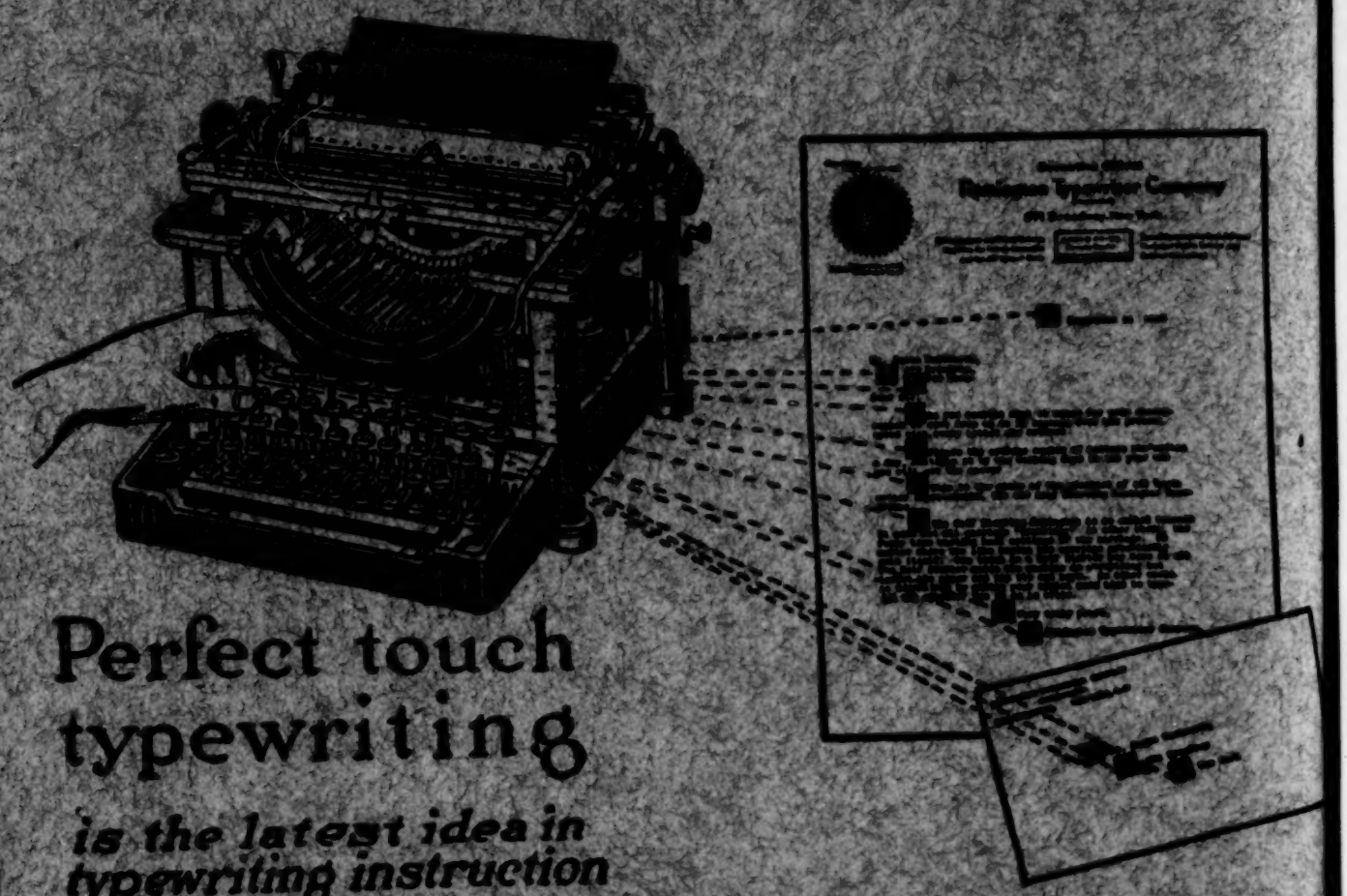

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VOLUME VIII SEPTEMBER, 1917 NUMBER 7

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

SOME CAUSES OF MISSPELLINGS

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Department of Educational Investigation and Measurement, Boston, Massachusetts

INTRODUCTION

For a considerable number of years, systematic efforts have been made to find out why school children are not able to show better results in spelling. This has been brought about in large measure, by the criticism of business men that children, graduates of the public schools, fail to spell the simplest words. This criticism, however, has been very general in its nature. The critics do not state whether all the children fail in a few words, or whether each individual finds a small number of words that are difficult for him to spell, or whether all the children fail in nearly all the words used in their written vocabulary. Regardless of how general the criticism has been, it has aroused educators to a sense of their responsibility, which in turn has resulted in a much closer study of the problems involved.

One of the problems involved in the study of the spelling question is the determination of the causes of various misspellings. In order to find an answer to this question, fifty words were selected from the Boston Minimum List[1] in the following manner. All of the words in the minimum lists of grade I to grade VII inclusive were dictated to a class of forty-two children in grade VIII in one of the Boston schools. These words were corrected and a distribution made according to the number of times they were misspelled. As a result of this distribution, the seventy-five percentile point was found. The words misspelled more times than the seventy-five percentile error were then selected and placed in forty-nine groups according to the number of times they were misspelled. After a conference with a number of interested persons, one word was selected from

[1] *Provisional Minimum and Supplementary Lists of Spelling Words for Pupils in Grades I to VIII.* School Document No. 8, 1914. Boston Public Schools.

each group with one exception. "Formally" in the grade VII list, and misspelled twenty-nine times, was not included because it was thought that it did not enter into the written vocabulary of the pupils sufficiently to be a fair test of eighth grade children in their spelling work. To complete a list of fifty words, "busy" and "does" were selected from the second grade list. "All right" and "used to," although not properly words, were included because it was desirable to find the results of spelling such phrases, as they had been indicated by the Boston teachers as troublesome. It may be that learning to spell certain phrases is just as important as learning to spell certain words.

Each of these fifty words was then put into a sentence which would illustrate its meaning and the word to be dictated underlined. The sentences showing the underlined words used in giving the test follow:

1. .....is *superintendent* of.....schools.
2. There is a *mortgage* of five hundred dollars on the house.
3. He asked for the *privilege* of going home at recess.
4. The car tracks are *parallel*.
5. The boy was *mischievous*.
6. Something should be done to prevent the frequent *occurrence* of fires.
7. We tell the day of the month by the *calendar*.
8. The *mosquito* is found in damp places.
9. It was *necessary* for me to be home by seven o'clock.
10. The teacher *referred* to yesterday's lesson.
11. The mother will *knead* her bread with her hands.
12. Henry read well, *especially* when the principal came in.
13. The boy rode a *bicycle*.
14. He stood *fortieth* in his class.
15. He did his work *thoroughly*.
16. You may *separate* the good papers from the poor ones.
17. The *twelfth* boy may stand.
18. The *plateau* is a high plain.
19. In a fraction, the number below the line is the *denominator*.
20. His examples are *all right*.
21. Some boys *misspell* their words.
22. Add the first *column* of figures.
23. There is a *bureau* in the bedroom.
24. The doctor has gone to see a *patient*.
25. The potato is a *vegetable*.
26. The boy had a *handkerchief* in his pocket.
27. The answer in division is called the *quotient*.
28. Ten from one hundred leaves *ninety*.
29. The man went to his *business* early in the morning.
30. The boy is *dining* in the large room.
31. Boston is the capital of *Massachusetts*.
32. The boy will *receive* fifty cents for his work.
33. The river formed the *boundary* line between the two states.
34. He *usually* does his work well.
35. Mr. Jones bought a dress for his *niece*.
36. He *used to* do his work well.
37. Every girl should be a good *daughter*.

38. The class is not *quite* ready.
39. Washington's birthday comes in *February*.
40. There is no school on *Saturday*.
41. Every one should be *busy*.
42. There is milk in the *pitcher*.
43. The man *chopped* wood.
44. People *laughed* at his funny actions.
45. It is (not) a *pleasant* day.
46. School begins in the *autumn*.
47. The sun is *shining*.
48. He *doesn't* know his lesson.
49. The boy *does* not like to sell papers.
50. It is very *quiet* in the room.

Selection of Children

Through the courtesy of the superintendents of three towns near Boston, the test was given to 993 pupils of the ninth grade. Each teacher gave the test according to the following directions:

Directions for Giving the Spelling Test

The sheet on which the pupil writes his words should be headed with the following information:

Name	School
Sex	Age at last birthday
Grade	Room

Pronouncing the words—

First, pronounce *once* the word in the sentence which is underlined. Then read the sentence aloud. Do not pronounce the word after reading. Allow plenty of time for writing the word. The sentences should be read in order, beginning with the first. Write on both sides of the paper.

Caution—

Each word should be pronounced naturally and distinctly by the teacher. Enunciate clearly, but not so as to suggest the spelling.

Collection and Correction of Papers

Upon the completion of the test, the papers were collected and sent to the office of the superintendent, from which place the bundle for the entire town was obtained. There was no objection to the teacher's correcting the words and giving the result to the class if she wished to. Whether this was done, or not, all the papers were corrected by the author. One of the superintendents had the teachers correct the words and send the results to his office. Tables were then made based on these returns. It is interesting to note that a review of the papers added approximately 16% to the errors in those schools.

Basis of Marking Words

A word was marked wrong if it was spelled wrong, or if the first letter was wrongly capitalized. That is, a word was marked wrong if it began with a capital letter when it should have been

a small letter, or if it began with a small letter when it should have been a capital. If there was any question in regard to the marking of a word the advantage was always given to the pupil.

Results of the Test

Causes of Misspellings

In a sense, spelling more than any other subject, may be said to be physiological. It has been said that any child that can see correctly can spell. That is, spelling is an act of seeing or hearing accurately what may be written or spoken, and translating that visual or aural image into motor activity. If the image is correct and the motor control is accurate, the word will be spelled correctly, otherwise an error will result.

In treating the causes of misspelling, the physiological basis will be discussed only incidentally. The causes which will be discussed are largely due to the methods of presentation, or to habits which have been formed by the child either before, or after he enters school, or to both of these causes combined.

In the early school, spelling was an independent study, even being used as a method of learning to read. It was impossible to understand how one could read if he could not spell. Drill in repeating the letters in their proper order was the important thing. In 1897 Rice questioned the value of this drill. Did it pay? Did we get the results which ought to be expected considering the time spent on the subject? He decided that we did not. Other investigators have taken up the study until we have a large mass of literature dealing with the subject of spelling in all its phases, and its value to the child and the community.

The aim of all teaching of spelling should be to give to the pupil the ability to spell a word correctly when it is needed. Our business men claim that the schools are failing in this particular. If our pupils are misspelling words which they ought to know how to spell, what is the reason? A knowledge of the causes of errors should lead to methods of eradicating the errors.

Table I shows the common misspellings and the number of times those misspellings occurred. The first column gives the list of words arranged in alphabetical order. In the second column is shown the number of times the word was misspelled.

In the next column is shown the number of different ways that the word was misspelled. Following this column are eight columns showing a few of the ways the word was spelled and the number of pupils spelling the word in this particular way. Where the words were misspelled in a given way by only a few pupils it has not been reported.

There are six causes of misspelling that will be considered in this paper: poor visualization or hearing, pronunciation, the vowel, the consonant, silent letters, and length of the word. These causes have been determined by a study of the 14,447 misspellings of the 50 words given to 993 pupils of the ninth grades in the three towns near Boston.

Visualization and Hearing

People are divided into six types, or classes depending upon how they receive impressions and how those impressions are remembered. These types are known as visuals, those who receive practically all their images through the eye; the audiles, those who receive their impressions through the ear; motiles, those who receive their impressions through motor activities; then the three types which may be made from a combination of any one with the motile and the combination of all three. The most common types are the combinations especially the visual-motile.

The aim of teaching spelling is the correct writing of words, a process which depends mainly upon a correct visual, or audile image coördinated with the correct motor control. In order then to get correct spelling from our pupils we should use these forces and work for a better training of the senses involved.

Ordinarily our methods of teaching spelling do not take advantage of sense training to the extent that is possible, or desirable. The method in general use is the teaching of the words, the study of the words by the pupil, either in the way suggested by the teacher, or in some way that the pupil devises for himself, followed directly, or at some time during the day of the lesson by a written test of the ability of the pupils to spell the words studied. In many cases the first step is left out entirely, and the pupil left to learn the spelling of his list of words as best he may. The fact is, *testing* in spelling has been far more important than the *teaching* of spelling.

TABLE I.

Showing the Common Misspellings, the Number of Times Spelled in a Certain Way

Words	Times Misspelled	No. Diff. Ways Misspelled	Misspelling	No. of Times	Misspelling	No. of Times	Misspelling	No. of Times	Misspelling	No. of Times
all right	623	17	alright	321	all-right	128	allright	124	right	23
autumn	278	27	Autumn	170	Autum	36	autum	34		
bicycle	475	60	bycicle	220	bycycle	50	bicyle	32	bicicle	17
boundary	155	18	boundry	100	boundery	35				
bureau	372	97	beareau	42	beauro	36	beaureau	34	bereau	22
									breau	22
business	154	20	buisness	82	bussiness	19	buisiness	12	busness	9
busy	58	12	buisy	33	bussy	10				
calendar	313	18	calender	239	calander	32	callendar	9		
chopped	117	17	choped	77	chop	12	chopted	7		
column	122	26	colum	41	collum	13	colume	10		
daughter	29	14	daughther	6	doctor	4				
					dauther	4				
denominator	212	60	denomenator	35	denominater	26	denomanator	15	denomator	13
dining	343	8	dinning	262	dineing	32	dying	21		
does	43	8	dose	36						
doesn't	254	32	does'nt	91	dosen't	62	dosent	16		
							dosn't	16		
especially	237	99	especialy	41	espically	18	espicially	11	especcially	9
February	268	22	Febuary	126	Feburary	92	Februrary	10		
fortieth	250	55	fourtieth	69	fortyeth	22	fortyth	15	fourtheth	11
									forthieth	11
handkerchief	285	51	hankerchief	113	handkercheif	26	handerchief	22		
knead	269	17	kneed	129	nead	71	need	40		
laughed	145	10	laugh	54	laughted	50	laught	30		
Massachusetts	241	56	Massachusettes	46	Massachuetts	45	Massachussetts	36	Masschusetts	10
mischievous	472	65	mischeivous	83	mischiefous	59	mischievious	58	mischevous	38
					mischevious	59				
misspell	447	10	mispell	335	misspelled	50	mis-spell	23	mispelled	13
mortgage	507	22	morgage	381	mortage	60	morage	15		

TABLE I.—Continued

TABLE I.—Continued

Words	Times Misspelled	No. Diff. Ways Misspelled	Misspelling	No. of Times	Misspelling	No. of Times	Misspelling	No. of Times	Misspelling	No. of Times
mosquito	372	102	misquito	89	mosquitoe	81	misquitoe	16	mosqueto	15
necessary	467	96	neccessary	107	neccesary	47	nessessary	32	nescessary	22
									nessary	22
									nessesary	22
									nessasary	22
niece	444	7	neice	425	neise	8				
ninety	335	17	ninty	305	ninity	5				
occurrence	654	46	occurence	227	occurance	206	occurrance	89	accurance	20
parallel	384	47	paralell	94	parellel	60	paralel	51	parrell	18
patient	65	20	patience	20	patent	9				
pitcher	181	24	picture	98	piture	23	picher	16	picther	14
plateau	130	49	plato	18	platue	14	plateu	12	pleateau	11
pleasant	114	5	pleasent	68	plesant	31				
privilege	490	43	privelege	106	priviledge	95	privalege	50	privilage	45
quiet	97	11	quite	67	quit	13				
quite	84	11	quiet	36	quit	26				
quotient	201	47	quotent	43	quotion	32	quotiant	14	quotiont	14
receive	215	9	recieve	177	received	21	recieved	9		
referred	380	20	refered	274	reffered	45				
Saturday	105	17	Saterday	50	saturday	25				
separate	200	8	seperate	187						
shining	270	12	shinning	210	shineing	25	shiny	25		
superintendent	579	101	superintendant	224	superentendent	46	supertendent	37	Superintendent	32
thoroughly	381	84	throughly	108	thouroughly	49	thoughly	26		
							thourghly	26		
twelfth	505	51	twelth	270	twelveth	88	twelvth	62		
usually	212	32	usally	90	usualy	25	useually	16	useaully	12
used to	572	37	useto	115	used	95	use to	92	used-to	78
vegetable	241	24	vegatable	123	potato	39	vegtable	28	vegitable	27

When there has been any teaching of the spelling word, it has generally taken the form of calling attention to the printed word in the book, or of presenting the word in writing on the board. If the book is used attention is directed to what the teacher considers the difficult parts of the words. If the presentation is made from the board, the troublesome letters are written in colored chalk, or otherwise marked. The point to be emphasized is that every word has some troublesome letter, or letters. These disturbing parts should always be impressed on the mind of the child at the first session with the word, if possible. Thus, the law of primacy which states that first impressions are more lasting is taken account of.

This method has a tendency to appeal to the visuals, but does not generally take the necessary steps to secure a reliable coördination between the visual image and the correct motor control. Without this latter, a valuable aid in the teaching of spelling is lost sight of. However, writing the words in practice to gain motor control, without voluntary attention may do more harm than good in securing this coördination.

Pronunciation

The second cause of failure to spell words correctly is pronunciation. When the child enters school he has a number of words which he can use in his endeavor to convey his thought through speech to some one other than himself. This number varies from 500 or 600 to as high as 1500, and depends largely upon the environment under which the child has grown up. If he has had the advantages of city, country, and seashore life, his vocabulary should be correspondingly large. If he has lived the most of his life in the back alley it will be small. The pronunciation of these words will be good, or poor, very largely as the pronunciation of his father, mother, and associates is good, or poor.

The habits of wrong, or correct pronunciation formed in the early years of the pupil's life, undoubtedly create a background which will materially aid the teacher in her work of teaching pronunciation, or greatly hinder it.

Pronunciation enters into the question of teaching spelling in two ways. First, when the pupil through his early habits has a wrong pronunciation, he must be given the correct one

upon his entrance into school. It is difficult to teach the correct spelling of "again" to a child who pronounces it "agin," or the spelling of "debt," when the pupil pronounces it as though it was spelled d-e-p-t. Second, pronunciation enters into the spelling lesson when a new word arises which has not entered the experience of the child. It is a fundamental principle of child psychology that it is only through experience that we gain any knowledge of the things about us. Also that the activity through which the knowledge is gained must be self activity. Our spellers present a series of words primarily for the purpose of having pupils learn how to spell them. Many of these words have never entered into the experience of the child. Under existing conditions this fact can be considered only incidentally. The important consideration is that the pupils must learn to spell the words of the day's lesson. If they do not know the meaning of the word from experience, we undertake to force it into their experience, and at the same time get them to learn the pronunciation by recourse to the dictionary. The results are many times deplorable.

Suzzallo calls attention to this same fact in his little book, "The Teaching of Spelling." He says that as long as the spelling lesson deals with words which the child has gained through experience, pronunciation plays a small part in the spelling lesson. The translation of an experience into a spelling is comparatively simple. When we undertake to translate the spelling of a word into an experience is when the difficulty begins.

There are two modes of learning the pronunciation of a word: First, by imitation; second, by the study of the letters, translating their phonetic sounds into written symbols. Each of these methods may result in the misspelling of a word.

In the first method the pupil may not hear correctly what is said by the teacher or pupil. As a result the child spells what he hears and not what is said. On the other hand there may be faulty articulation on the part of the teacher, or pupil, resulting in misspellings. Misspelling resulting from these two causes can be detected fairly easily, although which cause is operating cannot be determined. However, it is common knowledge that no one articulates so clearly and distinctly as he ought. For examples of this type of error, let us consider some of the misspellings shown in the test.

"Boundary" was misspelled 155 times, and in 65 per cent. of these cases the word was spelled b-o-u-n-d-r-y, which seems to be a probable case of poor articulation. Other cases may be "mischie-f-ous" for "mischie-v-ous," or the spelling of the same word with an "i" or an "e" following the "v," so that the spelling would be "mischie-v-i-ous." That one of these vowels followed the "v," or "f" in place of "v," in 38 per cent. of the cases, is surely significant. The teacher may be using faulty articulation, or she may be allowing the pupil to use it without sufficient emphasis upon the correct pronunciation to counteract the bad habit that has been formed. "Picture" for "pitcher" is another case of the same type. This resulted in an error in 54 per cent. of the cases. "Quite" is spelled for "quiet" 69 per cent. of the time, and "quiet" is spelled in place of "quite" 43 per cent. of the time. "Vegtable" in place of "veg-e-table" is another case of poor articulation.

Learning to pronounce by translating the phonetic sounds into words, probably results in a much larger number of errors in spelling. These errors are from two causes.

First, many of the letters of our alphabet have more than one sound. This is especially true of the vowels and is probably the reason that vowels are so apt to cause the misspelling of the word, as pointed out in a later section of this paper.

Second, the pupil is taught to use the phonegram as a means of translating the sound into the written word. Here again, however, the phonegram used and the spelling required may not agree. If the word is outside of the experience of the child, he has only analogy to guide him and the result is a large number of misspellings.

The use of analogy in spelling is very common. As a misspelling it may be a lapse, but more often it is probably a definite effort on the part of the pupil to spell the word correctly. When the misspelling is the result of using analogy as a means of spelling a word, the same form of misspelling is rarely used by a large number of children. Yet combined, it forms a large percentage of those who miss the word. For example, "all right" was spelled "a-l-l-w-r-i-g-h-t," "a-l-l-w-r-i-t-e," "a-l-r-i-t-e." "Boundary" was spelled "b-o-w-n-d-a-r-y"; "bureau," "b-u-r-o-u-g-h" and "b-u-r-r-o-w"; "column," "c-o-l-u-m-b"; "daughter," "d-o-t-t-e-r"; "doesn't," "d-o-z-e-n-t"; "patient," "p-a-t-c-i-e-n-t"; "quotient," "q-u-o-c-h-i-o-n"; "used to," "y-o-u-s-t-e-r."

The question of pronunciation looked at from this point of view becomes an important question in any consideration of the causes of misspellings. The pupil determining the pronunciation sometimes by himself, or upon the poor articulation of another person, has started a habit which if allowed to grow, will be a difficult one to break. Even if the error has been discovered soon, the law of primacy, that first impressions are lasting, has placed a handicap upon the pupil.

Effect of the Vowel

Our written alphabet is composed of three kinds of letters, those that extend above the line, those that extend below the line, and those that are only one space high. The vowels belong to the latter class of letters. Just how far this fact has to do with the misspelling of the word is not certain. What is certain is that there is nothing characteristic about the vowel to mark it from the other letters that are only a space high, and this lack of any characterization may make it difficult to fix the visual image of the letter. On the other hand, the fact that our vowels have so many different sounds, makes it difficult to fix the audile image. How much these two factors contribute toward the misspelling of a word is problematical. That the vowel in the word is almost sure to cause trouble is shown by the study of the misspellings of a group of children.

The effect of the vowel in causing misspellings may be illustrated by the following. "Especially" was misspelled 99 different ways by 237 different children. Of the different ways that it was misspelled, 14 per cent. used "a" as the first letter, and 31 per cent. used "a," "i," "ea," or "ei" in place of the "e" for the second vowel in the word. Following this there was a general mix-up in the vowels "ia." A fact that adds significance to these statements is that "s," "l," and "y" were written in every misspelling, while "p" was written every time but four. The letter "s" is a single space letter, but it has a very distinctive sound which probably accounts for its universal appearance.

"Bureau" caused a great deal of trouble in arranging the vowels in the acceptable manner. One pupil evidently desired to spell it as easily as possible and still get all the sounds in, and so spelled it "b-u-r-o." Others appreciated that it was a difficult word and wished to get enough letters in. The result is that we have "b-e-a-r-o-u-g-h," "b-e-a-u-o-u-g-h-t," "b-r-e-a-r-e-a-u," and

"b-u-e-r-a-e-u." The largest number spelling it any one way is represented by the 42 pupils who spelled it "b-e-a-r-e-a-u." It is closely followed by 36 pupils spelling it "b-e-a-u-r-o" and 34 pupils spelling it "b-e-a-u-r-e-a-u." An interesting fact in connection with this word is that the letter "b," that extends two spaces above the base line occurs in every word.

"Bicycle" is another word which causes trouble. Is it "b-i-c-y," "b-y-c-i," "b-i-c-i", or "b-y-c-y"? Of the 475 pupils misspelling the word, 242 or 51 per cent. chose "b-y-c-i," 34 or 7 per cent. chose "b-i-c-i," and 56 or 12 per cent. chose "b-y-c-y." The remaining 30 per cent. had trouble with other parts of the word. Again all but one began the word with a "b" and that one used a "p," spelling it "p-y-s-i-c-l-e."

"Occurrence" is another word in which the vowel causes trouble. Twenty-five per cent. of the misspellings began with an "a.' The second vowel caused some trouble, and the last syllable is the cause of a large part of the errors. Of those who misspelled the word, 41 per cent. spelled the last syllable "a-n-c-e," 26 per cent. spelled it "e-n-c-e," 17 per cent. spelled it "e-n-t-s" and 7 per cent. spelled it "a-n-t-s." Thus this point might be amplified. Is the "e" in "ninety" kept or dropped? Is "Saturday" "ur" or "er" for the middle syllable? How are the vowels arranged in "quite" and "quiet"?

Thus it is seen that the vowel plays a very important part in the misspelling of the word, due probably to two causes: first, the large number of sounds that any vowel may have; and second, possibly to the fact that the vowels are only one space high, and lack a certain characterization.

Effect of the Consonant and Its Doubling

The consonant does not give so much trouble as the vowel probably for the reason that there are few letters which have similar sounds. More than half of the consonants extend above or below the line and thus make it possible to visualize them more clearly.

The doubling of a letter, generally a consonant, does cause trouble. In "misspell" is it one "s" or two? Seventy-two per cent. of the pupils who made errors decided that there was only one "s." In "parallel," 78 per cent. apparently knew that two "l's" came together, but to get them in the right place and the remainder of the word correctly written was beyond their ability.

A significant point is that of the 384 pupils who misspelled the word, not one misspelled the first syllable.

An interesting and perfectly natural error was the use of "f" for "v" in "mischievous." This is not a case where the two letters have the same sound, but one in which the organs of articulation except the tongue are in the same position. The "f" is the lip sound and the "v" is a throat sound. Twenty-two per cent. used "f" for "v" in their misspellings of "mischievous."

The consonant then does not play so important a part in the misspelling of a word as the vowel. It is largely in the doubling of the letter that most of the trouble arises.

Silent Letter

Most teachers are cognizant of the fact that the silent letter is an important cause in the misspelling of a word. One would probably find the silent letter given attention in any teaching exercise more often than any other common cause of misspelling. That the silent letter gave trouble to the pupils who were tested is apparent when one looks at Table I. Five words are prominent on account of the single silent letter in the word. These are "handkerchief," "column," "knead," "mortgage," and "autumn."

In "handkerchief," 53 per cent. of the pupils who spelled it wrong simply left out the silent "d," 82 per cent. left out the "n" in "autumn," 69 per cent. left out the "n" in "column," 81 per cent. left out the "t" in "mortgage," and 47 per cent. left out the "k" in "knead." It is true that some of the pupils made other errors, but the above figures show that if they had written the rest of the word correctly more than half of the children would have had the word wrong simply because of leaving out the silent letter.

Length of Words

The errors under this head are probably due to two causes: (a) the difficulty of obtaining an image of the word as a whole, (b) the physiological difficulty which arises from not being sure just where you are in the word as you write. Many of the so-called lapses are probably due to this cause.

In regard to the first cause it is known that it is impossible to visualize more than four or five objects at one time. The result is that in a long word like "superintendent," it would be necessary to make four, or possibly five, movements of the eye

before all the letters could be seen. This means that the first group of letters would have to be remembered while looking at the second group, and so on. In other words, considerable care must be exercised before the letters in a long word can be seen in their true relation. Added to this, the coördination between the visual image and the motor image is made with considerable difficulty, and is undoubtedly the cause of many errors.

In tabulating the number of times each letter was used, two interesting points are noteworthy: (a) In place of the first "e", —"a," "i," and "ie" are used, and in 22 per cent. of the cases the vowel and the "r" following are interchanged. In place of the "i,"—"a" and "e" are used. In place of the second "e," —"a" and "i" are used. In place of the last "e,"—the use of "a" occurs in about half of the cases with the use of "i" very rarely. The interchange of "d" and "t" in the word is noticeable. This tends to bear out what was said under the section upon vowels and consonants. (b) Making a distribution of the letters as they occur in the misspelling, the following results are shown:

	S	U	P	E	R	I	N	T	E	N	D	E	N	T
Per cent. of occurrence	100	100	100	89	86	62	62	67	82	89	92	95	87	82

That is, the first three letters occur in every one of the misspellings. The "e" or one of the other vowels and the "r," either in its proper place or interchanged with the vowel occur in about the same percentage of the misspellings, 89 per cent. and 86 per cent. respectively. The three letters "i," "n," and "t," forming nearly the central group, occur respectively in 62 per cent., 62 per cent. and 67 per cent. of the misspellings. There is a gradual rise in the last part of the word with a drop in the percentage of occurrence for the last two letters. After the first three letters, however, there is never a return to 100 per cent. This would seem to point to the fact that in a long word the emphasis should be placed on the middle of the word, providing there is no inherent difficulty in the first part of the word.

Conclusions

1. There are two important causes of misspellings: first, the inability to form an image, either visual, audile, or motor, of the word which is being considered; and second, the inability

Below is given a list showing the various ways in which "superintendent" was misspelled, and the number of pupils spelling the word in the way indicated.

Superintendent—101

supantendant	1	supertan	1
supendient	1	supertant	2
supentendant	1	supertanted	1
supentendent	2	supertatain	1
superadenent	1	supertenant	1
superandent	1	supertendance	1
superantant	1	supertendant	21
superantendant	1	supertendend	1
superantendent	1	supertendent	37
superdendent	1	supertender	1
superdentent	1	supertendient	1
superendendent	1	supertentant	3
superendenent	1	supertindant	1
superendent	4	supertindent	1
superendient	1	supintendant	1
superentedent	1	supintendent	5
superentenant	1	supintentant	1
superentendant	21	supirentendant	4
superentendent	46	supperintendant..	1
superententent	1	supredendant	2
superentindent	2	supredendent	1
superident	1	supreintendent	2
superientendant	1	suprendent	1
superindendant	2	suprentendant	6
superindendent	6	suprentendend	1
superindenent	2	suprentendent	13
superindent	7	supretendant	7
superindentant	4	supretendent	7
superindentend	2	supretender	1
superindententent	5	supretin	1
superindetand	2	supretindent	1
superinten	1	supridendent	1
superintenant	2	supridentant	1
superintenat	1	suprindententent	1
superintend	1	suprintendant	4
superindtendent	1	suprintended	1
superintendant	224	suprintendent	16
superintended	1	suprintentant	1
superintenden	1	supritendant	1
Superintendent	32	supritendent	2
superintender	1	supruntent	1
superintendint	5	suptendant	1
superinteneat	1	supter	1
superintenent	1	supterdent	2
superintenion	2	supterindent	1
superintentend	1	supterintendent	1
superintindent	1	suptertendent	1
superitendent	2	suptientien	1
superitentend	1	surertendant	1
superntendant	6	surpertenant	1
superntendent	4		

to translate the pronunciation of the word into a spelling, unless the word becomes a part of the experience of the child.

2. There are four minor causes for the misspelling of a word.

The effect of the vowel
The effect of the consonant
The effect of the silent letter
The effect of a long word

The vowel becomes a cause because of the large number of sounds given to each vowel in the English language, with a possibility that our vowels, being only one space high, are not easily visualized. The consonant becomes a cause largely on account of its being doubled in the word. The long word becomes a cause on account of the inability to visualize the word as a whole, necessitating a number of eye movements, thus breaking the word into parts which may or may not correspond to the syllables of the word. The difficulty of making a perfect coördination between the visual image and the motor image, thus enabling the pupil to write the word correctly, is responsible for a large number of errors.

THE EDUCATION AND CONTROL OF THE EMOTIONS

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It is coming to be recognized more and more clearly that the native tendencies and capacities of the child furnish the raw material which it is the function of education to work over and to make available for the needs of the individual as an efficient member of society. In the past, the school as an educational institution has devoted its energies almost completely to the cultivation of a selected portion of this native equipment of tendencies and capacities, namely those which are concerned in the processes of cognition—the intellectual processes. The emphasis in the work of education has been put upon the development of the "mind," and has stressed such factors as memory, reasoning, abstraction, generalization, and the like. To that portion of the native equipment which includes the affective side of life, made up largely of what are known as the feelings and the emotions, comparatively little attention has hitherto been paid.

The school's neglect of this large and important part of our native equipment has been due to three reasons: (1) a mistaken conception of the school as an institution adapted primarily, if not solely, to the training of the intellectual "powers and capacities," and the inculcation of knowledge in the shape of information; (2) a lack of comprehension of the value of the emotional side of life; and (3) the absence of any method or system which might be applied to the training of the emotions in the same way that method is applied to the intellectual subjects. All three of these reasons have continuously been operative, although of course not always with the same degree of influence. The school has been narrowly intellectual; the emotions have been undervalued, even to the extent of being looked upon, with only a few exceptions, as detrimental and fit only for control by repression; and so complex is the question of their origin and nature that very few principles relating to their education can be laid down, to say nothing of any systematic method. Difficult as it has been to develop a method for the education of the intellect, it is a still more difficult task to formulate a

systematic method which may be applied to practical use in the education of native capacities of whose real nature we are so ignorant as we are of the emotional tendencies.

But these reasons for the neglect of the emotions in both the theory and practice of teaching are beginning to lose their cogency. The school is taking on a broader life, and is no longer content to leave the development and training of the emotions entirely to outside influences. Educators of the present day realize the necessity of making use of all the capital afforded by original nature, for they have come to see that the mind is not composed of, intellectual and emotional faculties set over against each other, but that there is a very vital connection and interplay of thoughts with feelings. A saner understanding of moral questions has accompanied the growth of the idea that original nature cannot be essentially "wrong," and we have come to understand that features of the emotional life which have heretofore been looked upon as fit only for repression, need only control and redirection to become of the greatest value; and that we cannot at all afford longer to leave them out of account in our educational scheme. We are also making progress in our knowledge of how to control and educate the emotions. The great and increasing interest which psychologists are showing in topics connected with the nature and origin of the affective states has led to a better understanding of them, and has given us practical suggestions as to methods of their control. It is true, as I have said, that nothing like a system, in the pedagogical sense, has yet been formulated, and that as yet most of the literature upon the education of the emotions is devoted to a discussion of the end that should be reached, rather than of the methods by which the desired result may be accomplished. But what we have serves at least as a beginning, and it is not too much to hope that some day, and not so very far distant, we shall have a practical method for the development and control of the emotional life.

Although this topic has suffered such neglect, it is one which is of the greatest importance. The school wishes to know how to provide for the proper development of the right kind of emotional life in its pupils. Individuals wish to know how to favor the development of the good emotion, and to call it into being; and, more often perhaps, how to inhibit the expression of injuri-

ous emotional states A knowledge of how to influence the feelings of others, of how to produce a desirable emotion or discourage the appearance of an undesirable one, would be of the utmost value to any teacher in the work of imparting instruction, as well as in the attempt to develop a well-balanced emotional life in his pupils. Nothing more than a few hints is as yet available for guidance in this kind of work, but meager as our information is, it is of great practical value, and any teacher who makes a really serious effort to apply it will secure important results.

The training of the emotions, as the training of all the instinctive tendencies, involves the encouragement of the useful ones, including provision for their exercise; the careful direction of those which either good or bad, according to the nature of their objects; and the discouragement, by inhibition or redirection, of those which are positively harmful. In this latter case, inhibition may take place by direct repression or by substitution. Probably no more common or characteristic device for educating or training the child's emotional reactions is used by adults than direct repression. Many parents have the habit of saying "Don't' 'to almost everything which the child has a mind to do. This sort of repression may be effectual in subduing at least a part of the outward expression of the emotional state, but as a means of control it is incomplete, because it does not go back to the source or beginning of the emotion; and it may result in actual damage because of the repression of the outward act, while the emotional stress goes on under the surface just the same, although denied its natural outlet.[1]

Of course, the general rule by which a teacher may be guided in his effort to develop good emotions is to provide every opportunity for the origin of such emotions, and then to see to it that the proper expression of the desired feeling is rewarded with pleasure, so that a definite connection may be set up between the emotional state and the pleasurable consequences. Conversely, in case of the harmful emotion, as far as possible every situation which tends to call it forth should be avoided, and unpleasant consequences should be connected with its expression.[2] This use of pleasant or unpleasant results is only an

[1] BURT, C. "*Psychology and the Emotions.*" School Hygiene, May, 1916.
[2] THORNDIKE, E. L. *Principles of Teaching.* P. 198.

application of Spencer's "doctrine of natural punishments." Its value here lies in the fact that experience, which involves the natural force of individual and social consequences, is a great molder of emotional life.[3]

Among educational writers a favorite prescription for the training of the emotions in connection with the work of the school is to use to this end art and literature, including biography and history. Horne, who has made a definite attempt to formulate a pedagogy of the emotions, places much emphasis upon this point, saying that art, literature, and history are the most effective instruments in educating the feelings;[4] and Bagley makes history, religion, literature, and the various forms of art the chief media for the transmission of emotions.[5] The psychological basis for all this is in the law that to arouse any emotion, we should arouse ideas which have gone with that emotion in the past.[6] If the child has not sometime experienced the desired emotion in connection with the ideas which are presented to him by the work of art or literature, or which come up by association, he will not feel it, except in the possible case of a situation so vivid as to arouse an instinctive response. It may be possible for the teacher, however, by presentation of different ideas, finally to call up the emotional state which is sought. The difficulty in doing this will depend, of course, upon the nature of the particular emotion or sentiment, and especially upon the frequency with which it is found to exist among children of the given age. It must be remembered, also, that the situation as presented in a picture, for example, does not call up precisely the emotion that would accompany the actual event. What we actually have in such a case is an aesthetic emotion—what Thorndike calls a "pseudo-emotion"—which does not cause the same strain as an actual emotion. But these emotions contribute much to the richness of life, and their reactions are not nearly so fatiguing as are those of the real emotions, which, in general, should be aroused only for the sake of action.[7]

A method of arousing a given emotion in a given situation, which is somewhat analogous to the teacher's use of art or liter-

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[3] READ, M. S. *An Introductory Psychology.* Chapter XIII.
[4] HORNE, H. H. *Psychological Principles of Education.* Part III.
[5] BAGLEY, W. C. *The Educative Process.*
[6] THORNDIKE, E. L. *Principles of Teaching.* P. 199.
[7] THORNDIKE, E. L. *Principles of Teaching.* Pp. 200–202.

ature, is the communication of it through imitation. "If the teacher and half of the class are thrilled with admiration for a member of the class who has honorably confessed his unfairness toward a classmate, the rest of the class will be more likely to admire him also."[8] This is only a particular case of suggestion, or the influence of the "strong idea," which may also sometimes be used by one individual over another, for the "spread" of an idea or sentiment, which may go on to completion in an overt act.

As an outgrowth of the James-Lange theory of the bodily origin of the emotions—although the principle was acted upon before that theory was announced—we have the insistence upon the bodily attitude of the expression of a given emotion as a means of furthering the development of that emotion. This method of emotional control is perhaps more frequently mentioned than is any other. James says that, within the limits of verification, experience corroborates rather than disproves the statement, correlative to his theory, that the voluntary arousal of the so-called manifestations of a special emotion ought to result in that emotion itself. Panic is increased by flight, grief is increased by giving way to its outward symptoms, melancholy is induced by a moping posture, and cheerfulness is the outcome of deliberately cheerful conduct. In his investigations, he finds that about one half of the actors questioned upon this point experience the real emotion to which their art gives external portrayal, and he accounts for the other half by saying that in them the visceral and organic part of the expression can be suppressed, and that it is probably on this that the chief part of the felt emotion depends. According to James, then, when we wish to cultivate a certain disposition, we should go through with the movements which make up the outward manifestation of that disposition.[9]

Thorndike follows James in stressing the value of assuming the characteristic bodily response in order to arouse a given emotion, or to establish a desired attitude or disposition. In illustration of how this may be done in practice, he writes:

"Let the frightened one walk steadily toward the enemy, looking him square in the eye, shouting in a loud voice, 'I'm not afraid of

[8] *Ibid.* P. 199.
[9] JAMES, WM. *Principles of Psychology.* Vol. II, Chap. XXV.

you, I'll eat you alive,' and brandishing his weapon as if about to knock down an elephant—and fear may be replaced by courage. If the kindergarten teacher who feels disgust at a dirty misshapen baby whose face is covered with sores and pimples will treat him just as she would a dainty, red-cheeked picture of health and cleanliness, take him on her lap, pet him, smile at him and caress him, she will often find disgust giving way to tolerance and even to affection.

"This * * is indeed the surest way to secure the presence of an emotion. In the long run our feelings grow into harmony with our conduct. Greed cannot live unsupported by greedy acts; the manifestation of love begets it; get pupils to act as they would if the emotion was felt and they will feel it, or, if they do not, will not need to. For in any case they will have the really valuable feature of the emotion, its influence on conduct."[10]

Münsterberg says that the feelings are essentially motor reactions, and that it is therefore possible to educate and train them through voluntary control of the movements in which they express themselves. The control of emotion, then, lies in the control of appropriate movements. To get a child to appreciate a picture, for example, put him before it and have him assume a "liking attitude," and the movements of this response will set up the emotion.[11] While it is impossible to say to just what extent one can control his emotions and feelings by assuming appropriate bodily attitudes, there must be something in the principle that, in order to cultivate a certain disposition, one must act as if he already possessed that disposition.

In order that the emotional life may be sound and healthy, the same conditions must be true for the body. Bodily health and activity make for a normal and happy emotional life. The emotions should have serviceable outlets, through right motor expressions. Burt insists upon the need of an "emotional hygiene," which shall include exercises in emotional expression, of some such nature as the system of eurhythmics developed by Dalcroze. Other means of physical outlet may be provided by sports, games, and plays.[12] Support is lent to the argument for provision of these outlets by the recent work of Cannon, who finds that the "coarser" emotional states are accompanied by an increased secretion of adrenalin with its resultant physiological effects.[13] Crile says that the vitalizing fluids which are

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[10] THORNDIKE, E. L. *Principles of Teaching.* Pp. 199–200.
[11] MÜNSTERBERG, H. *Psychology and the Teacher.* Chap. XXI.
[12] BURT, C. *"Psychology and the Emotions."* School Hygiene, May, 1916.
[13] CANNON, W. B. *Bodily Changes in Pain, Hunger, Fear and Rage.*

thus released may cause physical injury unless they are consumed by action, and that an unexpressed emotion is measurably relieved by muscular activity. For furnishing such relief, the value of games, especially such as take the form of a contest, is apparent.[14]

According to Pillsbury, the only real control of emotions is that which is effected at the source, and this is available only to some degree. His recipe for emotional control is to classify, and thus control, the situation which calls the emotion forth. The control of emotion, or of emotional expression, therefore, is chiefly in terms of the attitude which one takes toward the stimulus. This attitude is to a considerable extent under one's control, at least when falling outside that class of fundamental instincts which are most closely linked with their stimuli. Sensations and stimuli which are capable of being classified in different ways arouse different emotions upon the basis of that classification. For instance, a chance remark may be classified as an insult and arouse the emotion of anger, or the same remark, coming from a friend, may be classified as a jest and arouse an emotion of an entirely different sort.[15] This "control of attitude" is a sort of all-inclusive expression which covers several principles to which various authors have given different names. It really implies the inhibition of emotional expression by the application of the judgment,—the "intellectualization" of the situation, so to speak. It involves, as Thorndike says, learning to judge the situation objectively by the facts, not subjectively by the feelings about those facts; and then following the judgment rather than the feelings.[16]

If the emotional situation involves a personal stimulus, this application of judgment may have the effect of changing the stimulus from a personal to an impersonal nature, so that when the personal elements are once taken out of the stimulating situation, the emotional reaction loses its "zest" and rapidly fades away.[17] Since feelings can thus be reached indirectly through ideas and actions, it is possible sometimes for a teacher to relieve an over-emotional state in a child by counseling and

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[14] CRILE, G. W. *Origin and Nature of the Emotions.*
[15] PILLSBURY, W. B. *Essentials of Psychology.* Chap. XII; *The Fundamentals of Psychology.* Chap. XIV.
[16] THORNDIKE, E. L. *Principles of Teaching.* P. 96.
[17] BURT, C. *Psychology and the Emotions.* School Hygiene, May, 1916.

reasoning with him. Explanation of the situation in all of its bearings may change the object of the feeling and draw it off into harmless or, it may be, even into useful channels.[18]

Another way in which the expression of an emotion may be prevented is by "directing the attention" to something else, until the occasion for the emotion is past. A person who found himself in a situation normally provocative of anger, and who did not wish actually to become angry, might be able to turn his attention to something, inside or outside of the situation, of such a nature as to make it possible to "keep his mind," as we say, off the particular factor which would otherwise stir up the emotion which he was seeking to inhibit.[19] In effect, this is but another application of the principle of bringing about a change in the stimulus, without necessarily involving "reclassification."

Of those emotions which are good or bad only as they are directed to objects which are proper or improper, the method of control involves simply proper direction. Ambition, pride, anger, and other similar emotions, have their uses and are too valuable to be lost, but unless directed toward the proper objects, they are not only useless, but positively harmful. While hate, for instance, is entirely wrong if directed toward anything or anybody that is not the proper object of that emotion, it is, on the other hand, a matter of great importance to be able to hate aright,—to hate the things toward which that emotion has its proper direction.[20]

This method of control by direction is very closely allied to what is known as *sublimation*. The Freudians use this term exclusively in connection with the sexual instincts and the emotions connected with them, but by a somewhat similar interpretation it may be made to apply equally well to other emotions. It means the "long circuiting" of the instinct or emotion by associating it with other and better sentiments.[21] Colvin and Bagley, in their *Human Behavior*, define it as "the method which attempts to lift a strong feeling bodily out of the instinct to which it naturally belongs and to fasten it firmly to another

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[18] READ, M. S. *An Introductory Psychology*. Chap. XIII.
[19] PILLSBURY, W. B. *The Fundamentals of Psychology*. Chap. XIV.
[20] THORNDIKE, E. L. *Principles of Teaching*. P. 199.
[21] BURT, C. "*Psychology and the Emotions.*" School Hygiene, May, 1916.

object and to an entirely different process."[22] A rather commonly given illustration of this operation is the development of the sentiment of chivalry at about the time of adolescence as a sublimated form of the newly awakened sexual emotions. Colvin and Bagley give two excellent illustrations which I quote:[23]

"A very good illustration of an effective attempt to 'sublimate' a primitive instinct is to be found in the success of the Salvation Army. Here we see a military organization with innumerable suggestions of actual physical combat enlisted in the service of the most peaceable of ideals. The Boy Scout movement (as it has been developed in America) makes a similar use of the feelings connected with several of the primitive instincts, attaching them to other objects and insuring responses that are only *symbolic* of the actual primitive responses."

All of this means that an effective mode of emotional control lies in the formation of attitudes, ideals, and sentiments, by attaching appropriate ideas to the original emotion as a core. Much may be done in this connection by deliberate resolution to develop the appropriate attitude. Thus suppose one decides that he does not wish to give way to anger in a certain situation in which he often finds himself. Let him then make a deliberate resolution to avoid that situation as much as he possibly can, and thus give the emotion the fewest possible occasions for being aroused. Let him further resolve that, if he does find himself in the provocative situation, he will by no means allow his temper to get the better of him, that he simply will not become angry, that he will follow his judgment and change the stimulus; and he will have gone a long way toward the accomplishment of his purpose, and started upon a method which will become more and more effective as he continues to practice it.

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[22] COLVIN AND BAGLEY. *Human Behavior*. P. 159.
[23] COLVIN AND BAGLEY. *Human Behavior*. Pp. 159–160.

THE WEIGHTING OF POINT SCALE TESTS[1]

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The Yerkes-Bridges Point Scale as now used is a weighted scale, that is, the various tests are assigned different values in the scoring. For example, test 14, constructing a sentence with three given words, counts only 4 points, while test 15, Comprehending questions, counts 8 points towards the maximum of 100 points. Since the examination has for its object the measurement of mental ability, the tests would be correctly weighted if their scores were proportioned to their respective correlations with general intelligence. Now the only way we have of representing a subject's intelligence numerically is by the result of the mental examination. Hence, the problem of determining the correct weighting of the tests must be solved by a series of approximations.

It would have been simpler to construct a scale with unweighted tests, using either the all-or-none principle of scoring, or partial credits on a fixed scale. Neither of these devices is satisfactory, however.

The all-or-none method is wasteful. To take one of the most obvious illustrations, it requires the same amount of time to give the test of words in three minutes whether the subject responds with many words or few, and it is plain that 25 or 105 words, for example, is quite as significant as 60 (the number credited in the usual Binet test). We are throwing away both time and valuable evidence when, in scoring, we fail to recognize more than one result of such a test.

Again, if we give partial credits on a fixed scale (in this case five points for each test) we assume that all the tests are correlated alike with general intelligence, and the evidence does not bear out this assumption.

The scoring now in use for the Point Scale represents a first approximation to the correct weighting. A second approxima-

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[1] This problem was suggested by Dr. R. M. Yerkes, Psychologist, Psychopathic Hospital, as a first approach to the correct weighting of tests for the Point Scale. Being Contributions of the Mass. Commission on Mental Diseases, whole number 184 (1917. 4). The previous contribution was No. 183 (1917.3) by Dr. R. M. Yerkes, entitled "How May We Discover the Children Who Need Special Care?" (to appear in Mental Hygiene Vol. I, No. 2, p. 252.)

tion would naturally be based on a study of the correlations between the scores made on the several tests as now given and the total scores resulting.

These correlations have been computed for three different age groups of the school children whose records were used in calculating the published norms.[2] They are all children of English-speaking parents and were living in a medium to poor city neighborhood.

Group I consists of those members of the twelve-year-old and the thirteen-year-old age groups whose records show no zero scores, in all 53 subjects. It is roughly the equivalent of a somewhat higher age group, but an unselected group at this age might be expected to show higher correlations.

Group II consists of the entire nine-year-old age group, 43 subjects.

Group III consists of the entire six-year-old age group, 53 subjects.

Table I shows the values of r obtained for these three groups, together with their averages, the tests being arranged in the order of their correlation as represented by these averages. None of the coefficients is negative, but there are several zeros, and some other values are so low that their significance is open to question. The highest correlations appear under Group II. Thus for all three groups there are thirteen values above .60, and nine of these are under Group II, while only two of the eighteen values below .30 belong to that group.

It is noticeable that some of the tests that rank highest in order of correlation for the two older groups also rank well (though not highest) for the youngest group, and some of these, such as tests 4, 6, 9 and 15, could readily be modified by the addition of easier parts so as to be still better suited to the younger subjects.

On the other hand, tests 1 and 11 rank very low in all three groups. Test 11 was looked upon with suspicion at the time when the Point Scale was being developed. So much so that in the earlier form of the record sheet a test (16a) appears as a possible substitute. The line suggestion test was finally retained as being "a fair indication of varying suggestibility" so far as could be judged from the data then available. Judging

[2] YERKES, BRIDGES AND HARDWICK. *A point scale for measuring mental ability*, p. 66.

TABLE I.

Tests in Order of Correlation

Order	No. of test	Name of Test	Values of r for age groups I (12 & 13)	II (9)	III (6)	Av.	Weighting Act.	Sug.	Th.
1	9	Comparing remembered objects	.53	.73	.49	.58	6	9	9
2	15	Comprehending questions	.64	.68	.40	.57	8	8	9
3	20	Analogies	.58	.71	.42	.57	6	8	9
4	4	Memory for digits	.54	.62	.49	.55	5	7	8
5	13	Words in 3 minutes	.50	.65	.45	.53	4	7	8
6	17	Detecting absurdities	.53	.61	.33	.49	5	5	7
7	6	Repetition of sentences	.43	.59	.38	.47	6	6	7
8	10	Defining concrete terms	.44	.56	.34	.45	8	6	6
9	19	Defining abstract terms	.63	.62	0	.42	6	6	6
10	18	Dissected sentences	.52	.63	0	.38	6	5	5
11	12	Copying square and diamond	.21	.39	.52	.37	4	4	5
12	5	Counting backward	0	.50	.61	.37	4	4	5
13	8	Arranging weights	.19	.37	.51	.36	2	4	4
14	16	Designs from memory	.26	.44	.36	.35	4	4	4
15	7	Reaction to 3 Binet pictures	.17	.30	.54	.34	9	6	4
16	2	Detecting missing parts	.11	.28	.61	.33	4	4	4
17	14	Sentence with 3 given words	.26	.61	.12	.33	4	3	4
18	3	Comparison of lines and weights	0	.57	.29	.29	3	2	3
19	11	Resisting suggestion	.16	.20	.29	.22	3	1	1
20	1	Choosing of prettier	0	.35	.24	.20	3	1	1

from these correlations, however, this type of suggestibility is not highly correlated with general intelligence, and the early suspicions of the test are justified.

The column "actual weighting" gives the scores now in use.

The "theoretical weighting" was obtained as follows. It was assumed that the highest score would be 9, as heretofore, and that in view of the very low correlations of some of the tests, the minimum score should be 1. By means of a graph the tests were then weighted, to the nearest unit, in proportion to the corresponding values of r (Figure 1).

This gave to tests 2, 3, 14, 16 and 19 the same scores as at present. For some others, such as test 9, Comparing remembered objects, the change to the theoretical value is easily made. Subjects often volunteer more than two items of difference in making these comparisons, and if we credit 1 point for 1 item of difference, 2 points for 2 items, and 3 points for 3 or more items, we obtain 9 as the maximum, which is the theoretical weighting. Certain other tests, however, such as test 15, Comprehending questions, do not lend themselves so readily to this

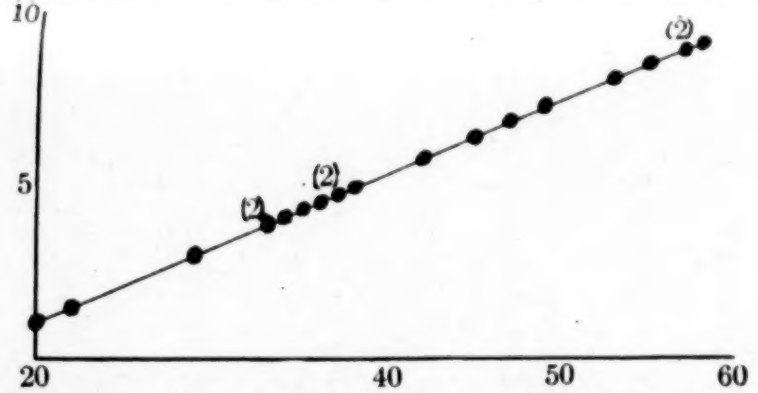


FIGURE 1. Graph for determining theoretical weighting. Ordinates = scores; abscissae = average coefficients of correlation.

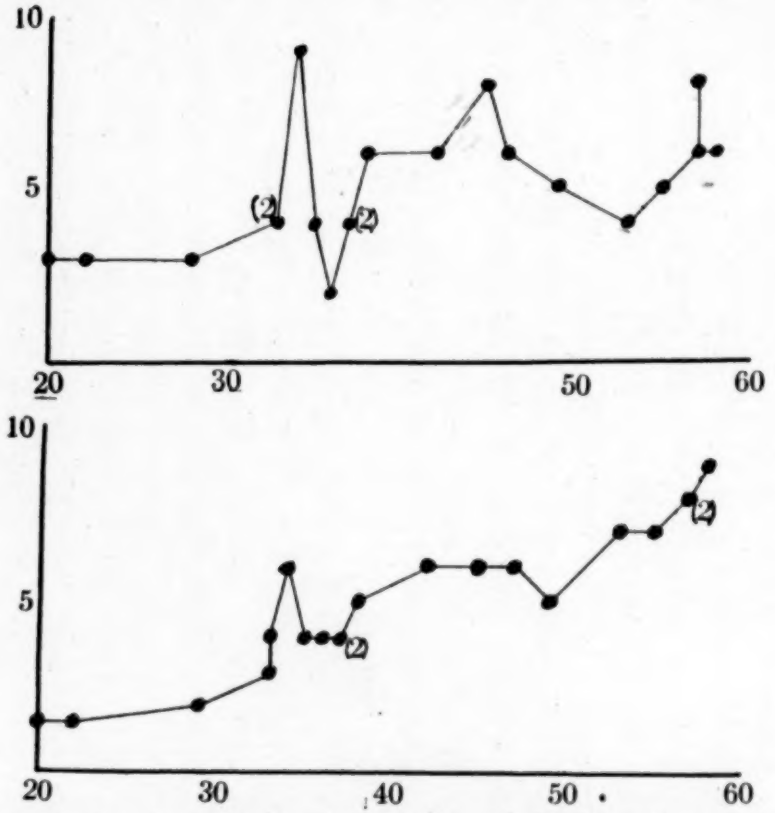
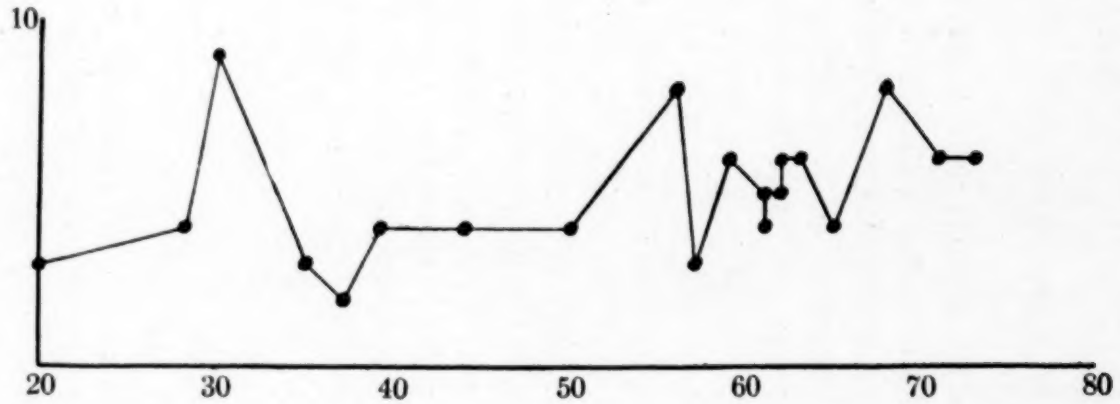


FIGURE 2. Graphs showing relation of actual and suggested weighting to the average coefficients of correlation. Ordinates = scores, for the upper curve the actual and for the lower curve the suggested weighting; abscissae = average coefficients of correlation.



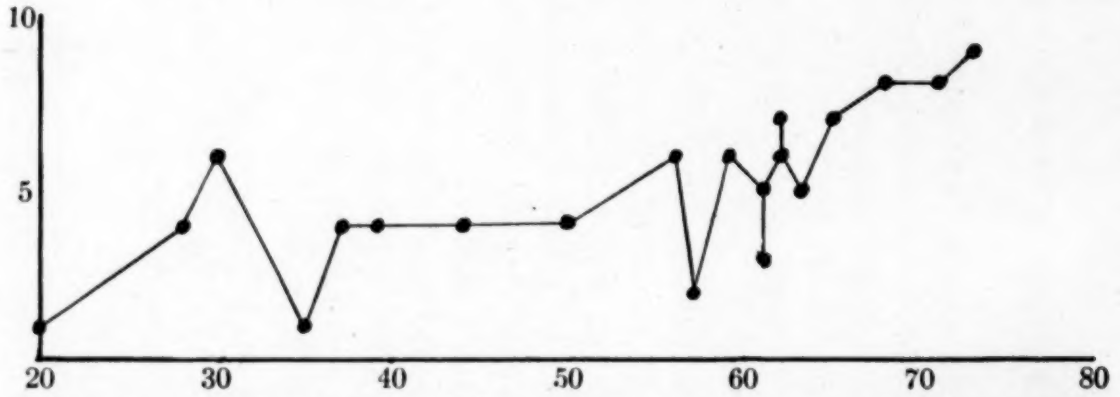


FIGURE 3. Graphs showing relation of actual and suggested weighting to coefficients of correlation for Group II. Ordinates = scores, for the upper curve the actual and for the lower curve the suggested weighting; abscissae = coefficients of correlation for Group II.

readjustment, and the column headed "suggested weighting" represents a compromise between theory and practice. In no case has a score been changed by more than three points, and the modifications have been such as to give a total of 100 points, as at present, instead of the inconvenient 109 which is the sum of the "theoretical" values. Other considerations were taken into account in rating the individual tests. Thus test 7, Reaction to 3 Binet pictures, should theoretically be reduced from 9 points to 4, but its correlation coefficient is .54 at six years and, since this age group is more meagerly represented than the others in the examination program as a whole, this score was held at 6 points. On the other hand, test 3, Comparison of lines and weights, was reduced one point below the theoretical weighting because its only high correlation appears in Group II which has the advantage over both of the other groups in the program as a whole.

The graphs of Figures 2 and 3 indicate the relation of the "actual" and the "suggested" weighting to the order of correlation as represented respectively by the averages for all three groups and by the coefficients for Group II. The curve should approximate that of Figure 1. The improvement is most evident in dealing with the averages, as was to be expected, but it is recognizable also for the nine-year-old group. In Figure 2, the lower curve presents two marked irregularities, namely, a high point for the sixth test in ascending order of correlation and a low point for the fifteenth. The former test is the Reaction to 3 Binet pictures, and the reason for giving to that 6 points instead of 4 has been explained already. The latter is the Detection of absurdities, and this was held at 5 points because of the practical difficulty of deciding how to give the two additional points which theory demanded.

The "suggested" weighting leaves the scores unchanged for eight tests, namely:

Test 2, Detecting missing parts.
" 5, Counting backwards.
" 6, Repetition of sentences.
" 12, Copying square and diamond.
" 15, Comprehending questions,
" 16, Designs from memory,
" 17, Detecting absurdities, and
" 19, Defining abstract terms.

For the remaining twelve tests the suggested weighting might be obtained in various ways. In order to try out the new values with the records of some examinations already made, the rules for scoring were modified as follows:

Comparing Remembered Objects

3 points credit for 3 or more correct items of difference.

Analogies

e and f, each, 2 points credit.

Memory for Digits

d and e, each, 2 points for success in first trial, 1 point for success in second trial.

Words in 3 Minutes

15 to 29 inclusive, 1 point, 30 to 44 inclusive, 2 points.
45 to 59 inclusive, 3 points, 60 to 74 inclusive, 4 points.
75 to 89 inclusive, 5 points, 90 to 104 inclusive, 6 points.
105 and upward, 7 points.

Defining of Concrete Terms

b disregarded.

Dissected Sentences

c, 1 point credit.

Arranging Weights

4 points for correct arrangement in first trial.
3 points for correct arrangement in second trial.
2 points if in either trial the arrangement is correct except for the transposition of two consecutive weights.

Reaction to Binet Pictures

No credit for interpretation.

Sentence with 3 Given Words

3 points credit if the 3 words are used in one sentence.
2 points credit if they are used in two sentences very loosely connected.
1 point credit if they are used in two separate sentences.

Comparison of Lines and Weights

b and c together 1 point credit, that is, no credit on these two if there is a failure in any one of the four trials.

Resisting Suggestion

1 point credit if the suggestion is not accepted more than once.

Choosing of Prettier

1 point if not more than one of the three pairs of faces is incorrectly judged.

TABLE 2

Illustrative Records

(In Order of Increasing Scores)

Order	No.	Sex	Age Chron.	Age Ment.		Scores Act.	Scores Sug.	Change in score
1	12	m	6.2	less than 4		16	15	—1
2	6	m	8.5	5.5	N–E	24	22	—2
3	9	f	4.8	5.4		25	22	—3
4	1	m	6.7	7.0		35	30	—5
5	2	f	7.7	8.7	N-E	45	42	—3
6	11	f	8.7	9.2		57	53	—4
7	13	f	14.5	9.2		57	53	—4
8	14	f	19.8	10.7		64	60	—4
9	8	m	14.0	11.2		67	63	—4
10	10	m	13.7	11.6		72	69	—3
11	4	f	19.2	14.0		81	78	—3
12	3	m	14.5	17.5		87	81	—6
13	5	m	14.4	18.0		88	83	—5

(Mental ages marked N-E were computed from the non-English-speaking norms.)

Table 2 shows the effect of this revision in thirteen cases,[3] arranged here in order of increasing scores. It is evident that the "suggested" weighting, thus applied, tends to lower the total score by from 1 to 6 points, and that the lowest scores are the least affected. The lowering of the totals might have been anticipated from the fact that in these three groups high correlations are generally found with average scores of medium value, and low correlations most frequently with high average scores (Table 3). This is especially marked in the two older groups. It is what might be foreseen from theoretical considerations. The more highly a given test correlates with general intelligence, the more closely will the curve of distribution for the scores of that test approximate the normal, bell-shaped form, the average score at the same time approaching fifty per cent. of the maximum for that test. On the other hand, if the average score for a certain test is very high or very low we may expect it to show a low correlation with general intelligence. It is to be noted that the situation in this regard is totally different from that which obtains for the Binet age scale in its various forms.

That the lower scores of Table 2 are least affected by the revision is accounted for when it is seen (Table 3) that for Group III some of the lower correlations are found in conjunction with very low scores, the two zero correlations corresponding to zero scores.

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[3] These subjects are children in the care of the N. E. Home for Little Wanderers, and were examined there as a matter of routine.

TABLE 3

Percentage Values of Average Scores

(In Order of Correlation of Tests)

Order	Group I			Group II			Group III		
	No. of test	r	Av. Score	No. of test	r	Av. Score	No. of test	r	Av. Score
1	15	.64	81	9	.73	80	2	.61	68
2	19	.63	68	20	.71	20	5	.61	25
3	20	.58	57	15	.68	41	7	.54	59
4	4	.54	86	13	.65	48	12	.52	40
5	9	.53	98	18	.63	25	8	.51	20
6	17	.53	76	4	.62	72	4	.49	56
7	18	.52	65	19	.62	15	9	.49	25
8	13	.50	85	14	.61	50	13	.45	15
9	10	.44	81	17	.61	28	20	.42	2
10	6	.43	77	6	.59	65	15	.40	14
11	14	.26	93	3	.57	83	6	.38	65
12	16	.26	73	10	.56	60	16	.36	10
13	12	.21	93	5	.50	95	9	.34	41
14	8	.19	95	16	.44	30	17	.33	2
15	7	.17	84	12	.39	75	3	.29	57
16	11	.16	93	8	.37	70	11	.29	37
17	2	.11	100	1	.35	100	1	.24	77
18	3	0	100	7	.30	71	14	.12	1
19	1	0	100	2	.28	93	19	0	0
20	5	0	100	11	.20	50	18	0	0

In making up this group for purposes of illustration the intention was to include as great a variety as possible, in the hope that some of the changes in score might be of interest in connection with the types of case involved.

Subject No. 1 shows an unexpectedly heavy loss. He did surprisingly well in the examination and in some "performance" tests which were given him, but in the early part of the interview his expression and manner gave a strong impression of feeble-mindedness, and some of his social reactions, as reported, are suggestive of mental deficiency.

In the other cases the effect of the change in scoring seems to be correlated with the total score and not at all with the type of case. Thus No. 11 is a normal child of a good type mentality, while No. 13 is a high-grade defective and calls for institutional care. Yet their scores are identical for both ways of reckoning.

As the rules followed in these illustrative cases might seem arbitrary, the score was made up by proportion for one subject, No. 5 in Table 2. Using the suggested weighting his score becomes 86.6, and using the theoretical weighting and reducing to the scale of 100, it is 84.3. This indicates (1) that correct weighting would tend to lower the total scores, (2) that the sug-

gested weighting does not tend to lower them unduly, and (3) that the rules followed in working out the illustrative cases are only approximately satisfactory.

In scoring test 7, it is a question whether it was justifiable to disregard interpretation. It might be fairer to disregard entirely one of the three pictures. It is doubtful, however, whether in the present form of the test failure to interpret should be allowed to count against a subject. Some of the ablest individuals do not understand the question in this sense. As the test is modified in the adult scale this objection is removed, and the score may be expected to show a much higher correlation with general intelligence.

Comparison of the values of r with the actual scores indicates that higher correlations tend to appear for those tests which offer the greatest number of possible gradations in the scoring. Hence, if test 13 is scored as in the illustrative cases it may be expected to show a higher correlation than at present. It is likely, moreover, that the improvement would be greatest for Groups I and III where this test is now weakest. The separation of concrete terms and abstract terms, so as to make two tests in defining, seems artificial, and if these tests (10 and 19) were treated as one, a higher correlation might be expected to appear. A like statement might be made in regard to test 3, b and c, Comparison of weights, and test 8, Arranging weights.

AN ANNOTATED BIBLIOGRAPHY OF RECENT LITERATURE ON THE BINET-SIMON SCALE (1913–1917). PART I.

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Research Fellow Under the Buckel Foundation, Leland Stanford Jr. University

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Correlation between mental age and performance in the size-weight illusion.

84. DOLL, E. A.: *Suggestions on the Extension of the Binet-Simon Measuring Scale.*

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88. DOLL, E. A.: *The "A" Test with the Feeble-minded.*
Training School Bull. 1913, 10: 49–57.
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90. DOLL, E. A.: *Children's Ages.*
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Explanation of the quotient, its value and shortcomings. The I. Q. not valid "when mental age exceeds eleven years or where the difference between mental and chronological age exceeds four or five years." In some cases I. Q. of little value, in others may be misleading.

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Publ. No. 6, Dept. Research., Trg. Sch. Vld., N. J., 1916.
A review and reply to comments made regarding the question of tests beyond age 12.

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Training School Bull. 1916, 13: 54–61.
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Paper read before Amer. Psychol. Assoc., 1914.
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Correlation between Binet age and anthropometric measurement. Anthropometry has diagnostic value.

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98. DOWN, R. LANGDON: *Practical Application of the Binet Tests.*
In Conference Report, National Assoc. for the Feeble-minded, London, June 23, 1915.

99. DOWNING, BERTHA C.: *Classification of the Mentally Defective by Mental Tests.*
(Reprint from the Woman's Medical Journal) Sept., 1911, 15 pp.
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100. DREVER, JAMES: *The Scope and Methods of Experimental Education.*
Child Study 1915, 8: 41–50.
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101. DRUMMOND, MARGARET: *The Binet-Simon Tests of Intelligence.*
Child 1915, 5: 311–316.
An explanation of the scale, with brief historical summary.

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Child Life, Oct., 1915.

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London: Arnold, 1915, 237 pp.
A very brief explanation of the scale.

105. DRUMMOND, W. B.: *Binet-Simon Tests as a Means of Grading Mental Defectives Under the Mental Deficiency Act.*
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In Fourth Annual Report of the Neurological Institute of N. Y.
N. Y.: Neurological Institute, 1914, 47 pp.
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111. Emerick, E. J.: *The Defective Delinquent in Ohio.*
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Summary of the results obtained from the examination of one hundred boys and 100 girls in two state reform schools. (Discussion by A. W. Butler, and E. J. Emerick.)

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N. Y. Med. Jour. 1913, 48: 175 ff.
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113. Farrell, Elizabeth E.: *A Study of the School Inquiry Report on Ungraded Classes.*
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115. Fernald, Grace M.: *Report of the Psychological Work in the California School for Girls.*
J. of Delinq. 1916, 1: 22–32.
General plan indicated, methods of examination, and results obtained. Application of psychological findings to the organization of the school.

116. Fernald, Grace M.: *Results of Tests with Specific Cases with Emphasis on the Study of the Delinquent Type.*
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(Abstracted in Psychol. Bull. 1915, 12: 318–319.)
Results from examination of delinquent girls by the scale.

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Proc. Nat. Conf. Char. and Corr. 1916, pp. 538–546.

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J. Crim. Law & Criminol. 1916, 7: 393–404.
Some general considerations.

119. FERNALD, W. E.: *The Diagnosis of the High Grades of Mental Defect.*
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Boston: Wright & Potter Prntg. Co., 1914, 86 pp.
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121. FRADKIN, ELVIRA K.: *A Discussion of the Hospital Clinic for Mental Cases and Its Relation to the Public School.*
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The qualifications of the clinicist.

122. FREEMAN, F. N.: *The Psychology of the Common Branches.*
N. Y.: Houghton, Mifflin Co., 1916, 275 pp.
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123. FREEMAN, F. N.: *Experimental Education.*
N. Y.: Houghton Mifflin Co., 1916, 220 pp.
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124. FREEMAN, F. N.: *Tests.*
Psychol. Bull. 1913, 10: 271–274.
A resume of the year's literature and the advances made in using the scale

125. FREEMAN, F. N.: *Tests.*
Psychol. Bull. 1914, 11: 253–256.
A review of some of the test literature.

126. FREEMAN, F. N.: *Tests.*
Psychol. Bull. 1915, 12: 187.
A brief discussion of the test contributions during the year 1914.

127. FREEMAN, F. N.: *Tests.*
Psychol. Bull. 1916, 23: 268–271.
A review of contributions made within the period 1915–1916.

128. FREEMAN, F. N.: *Mentality Tests: A Symposium* (see later reference).
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"Functions which show marked development with age must be the chief subjects of intelligence tests." Objection to the scale is made because "it lumps together scores on too many different functions, and not the same functions throughout the scale."

129. GALBREATH, NEVA L.: *A Revision of the Binet-Simon Scale for Measuring the Intelligence of School Children.*

A thesis presented to the Dept. of Education, Leland Stanford Jr. University, May 5, 1914.

A preliminary Stanford Revision, giving tests for each age from 2 to 15 and also for adults. Practical application to children in four California schools.

130. GATES, A. I.: *The Mnemonic Span for Visual and Auditory Digits.*

J. of Exper. Psychol. 1916, 1: 393–403.

"The average span for college students is approximately 8.2 digits when the visual method of presentation is employed, and 7.7 digits with the auditory method."

131. GAULT, R. H.: *Preventives of Delinquency.*

J. Crim. Law & Criminol. 1914, 4: 637–641.

Cites case from unpublished report of Dr. Bernard Glueck of an Italian testing only 9 who accumulated a fortune in America, returned to Italy, purchased a farm, and returned to America to repeat the process. This individual was pronounced defective. Discussion of mental tests as aids in preventing delinquency.

132. GAULT, R. H.: *The Laboratory in the Criminal Court.*

J. Crim. Law & Criminol. 1914, 5: 167–169.

Reporting the findings of the Psychopathic Laboratory connected with the Chicago Courts.

133. GIESE, FRITZ: *Ueber die Testdiagnose*

Zsch. f. pädagog. Psychol. 1915, 16: 193–197.

The scale is not as valuable for adults as for children. For adults special tests are required to determine individual differences in function.

134. GODDARD, H. H.: *Percentage of Feeble-mindedness that is Hereditary According to the Degree of Defect.*

Paper read before Amer. Psychol. Assoc., 1914.

(Abstracted in Psychol. Bull. 1914, 11: 61–62.)

The higher the intelligence among the feeble-minded, the greater the possibility of transmitting mental defect. Feeble-minded children tend toward the same intelligence level possessed by their parents.

135. GODDARD, H. H.: *Two Cases of Criminal Imbecility.*

Paper read before Amer. Psychol. Assoc., 1914.

(Abstracted in Psychol. Bull. 1915, 12: 76–77.)

A discussion of two feeble-minded murderers examined with the scale.

136. GODDARD, H. H.: *The Binet Measuring Scale of Intelligence: What It is and How It Is to be Used.*

Training School Bull. 1914, 11: 86–91.

School instruction has slight if any influence on scale ratings. Scale most accurate and practical method yet devised for estimating intelligence development. Highly trained experts required to apply the tests accurately. Teachers, however, can greatly benefit by its use, although finest results cannot be expected. Cautions against using the scale "in part."

137. GODDARD, H. H.: *A Brief Report on Two Cases of Criminal Imbecility.*

J. of Psycho-Asthen. 1914, 19: 31–35.

These two cases (feeble-minded boys, both about 11 years mentally) "are probably epoch-making in that they are the first instances in judicial procedure in which so high a grade of mental defectiveness has been recognized by the court."

(Discussion by E. J. Emerick, G. Wallace, A. C. Rogers, C. Bernstein, and W. E. Fernald.)

138. GODDARD, H. H.: *Who is Mentally Defective—How Many Are There—And How Can They Be Detected?*
Fourth Intern. Congr. on Sch. Hyg., Buffalo, 1913, Vol. V, pp. 621–626.
The use of the scale in helping solve the problems indicated.

139. GODDARD, H. H.: *Tests of Intelligence.*
In Reference Handbook of the Medical Sciences, pp. 607–613.
An excellent summary of the scale, how it was derived, what it is, and how it is applied.

140. GODDARD, H. H.: *Mental Deficiency.*
In Reference Handbook of the Medical Sciences, pp. 379–385.
The use of the scale for purposes of classification.

141. GODDARD, H. H.: *Teachability of the Feeble-minded.*
J. of Psycho-Asthenics 1913, 18: 54–60.
The question of education in relation to mental age.
(Discussion by A. C. Rogers, W. E. Fernald, C. Bernstein.)

142. GODDARD, H. H.: *The Binet Tests in Relation to Immigration.*
J. of Psycho-Asthen. 1913, 18: 105–110.
The use of the scale increased nine-fold the efficiency of detecting feeble-mindedness at the Ellis Island immigration station.
(Discussion by W. E. Fernald, W. Healy, C. S. Berry, H. H. Goddard.)

143. GODDARD, H. H.: *The Adaptation Board as a Measure of Intelligence.*
Training School Bull. 1915, 11: 182–188.
Correlation between mental age and ability in this test. Finds it very satisfactory as a test for age 8.

144. GODDARD, H. H.: *A Course of Study for Teachers of Mental Defectives.*
School and Society, 1916, 3: 497–502.
Indicates that a course of training for teachers covering two years (2000 hours) should include the diagnosis of feeble-mindedness to which 100 or more hours, ought to be devoted.

145. GODDARD, H. H.: *"Schools and Classes for Exceptional Children."*
J. Educ. Psychol. 1916, 7: 287–293.
A criticism of the report of David Mitchell for the Cleveland Foundation (See later reference.)

146. GODDARD, H. H.: *Mentality Tests: A Symposium.* (Extracts from a personal letter to C. E. Seashore. See later reference.)
J. Educ. Psychol. 1916, 7: 231–233.
"Your symposium sounds like a good thing and undoubtedly it will be interesting reading, but I really do not look for any great unanimity until more people get down to solid work on the problem." Mentions Terman and Kuhlmann who have profited by all of Binet's work, and are now going on where he left off. "I use the Binet tests because they are so far the best that have been produced." "I have found from nearly ten years' living with the feeble-minded that Binet was correct in his theories of the feeble-minded and of their psychology, to a much greater extent than is given to most mortals."

147. GODDARD, H. H.: *The Hygienic Value of Grading a School According to the Intelligence of the Pupils.*
Proc. Eighth Congr. Amer. Sch. Hyg. Assoc., San Francisco, 1915, Vol. V, pp. 157–162.
The importance of grading by mental age indicated.

MANUAL ACCURACY IN PREVOCATIONAL-SCHOOL BOYS

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The following is a summary of work done in one of the "Ettinger" prevocational schools of New York City, to determine by means of tests, whether any change in general manual accuracy, due to shop practice, can be discovered in boys taking the first year of the prevocational work. A two-year course is offered for the 7th and 8th grades, giving training in eleven of the trades, each of which requires a considerable degree of manual accuracy. During the first year a boy passes through three of the shops, spending three hours a day in that work.

The problem then was to discover if the effects of shop practice are transferred. The procedure adopted and carried out was to test at the beginning of the school year,—during the eleven school days from September 28 to October 14, 1915,—a large group of PV[1] boys, and a control group of A boys from the same grade. There were 96 subjects in each group. At the end of the year—from June 5 to 13, 1916—the same tests were repeated with the same boys. At that time there were remaining in the school 62 of the A and 61 of the PV subjects who had taken the tests. These only were considered in any of the results. In so far as the tests are a reliable index of manual accuracy, a comparison of the results of the two testings should indicate any change in ability.

It was required that the tests should be exclusively manual, not confined to small movements, and should be simple and quick in operation. Fifteen minutes per subject was about the time required. Three tests were used, the first called the Thrusting. In this test there passes at a constant speed past a slit in front of the subject, horizontal rows of capital O's, three O's in each row, and no row more than 11 cm. wide. One row only is in sight at a time. The position of each O relative to the others in the row, varies each time. The middle O of the three is always the target, which the subject endeavors to hit with a pencil, as the rows go past the slit. A set is composed of thirty rows. Four sets are presented to each subject, the first allowing each row to be in sight 2.0 sec., the next 1.6 sec., the next 1.2 sec., and the last, 1.0 sec. A perfect hit was scored six (6), a miss three

[1] PV refers in each case to the Prevocational group, and A refers to the Academic.

(3), a hit at a wrong O one (1) and the omission of a hit zero (0). The scores might thus range from zero, where not any hit was made, to 180, where every middle O was hit.

The second test was the Hammering. In this the task was to hit with a small hammer three points, one after another, at the rate of fifty blows in thirty seconds. The points were in a triangular circuit, mutually distant 51 cm. The average number of hits in two trials was the score used. The third test used was the Three-Hole test, quite commonly employed and sometimes known as a "Coördination" test. The measure used was the time taken for fifty contacts.

Table I gives the Median, Average, and Probable Error of the Average of the thrusting test scored on the basis mentioned above. It shows that there was practically no change in either group between the times when the two tests were made.

TABLE I.

Showing Scores in Thrusting Test for Both Groups at the Beginning and End of the Year

	Speed 2.0			Speed 1.6			Speed 1.2			Speed 1.0		
	Med.	Av.	P.E.	Med.	Av.	P.E.	Med.	Av.	P.E.	Med.	Av.	P.E.
Academic												
1915.....	120	120.5	11.5	113	117.6	13.4	111	112.1	7.9	105	103.4	10.6
1916.....	114	116.9	8.9	111	112.5	7.5	108	108.1	5.9	107	108	7.0
Prevocational												
1915.....	114	117.2	6.2	115	117	9	111	110	8	105	105	12
1916.....	116	115.9	10.1	115	113.1	6.9	111	110.8	5.8	105	106.5	7.5

Individual changes, to justify these figures, show the following facts, according as the subjects did better or worse at the end of the year:

	Better		Equal		Worse	
Speed	A	PV	A	PV	A	PV
2.0	26	28	4	3	32	30
1.6	24	21	1	3	37	37
1.2	23	29	2	3	37	29
1.0	39	32	2	1	21	28

Table II shows the results in number of hits of the hammering test. The PE's are here so large that the figures are not seriously considerable. However, taking them for what they are worth, they seem to show a serious decline in ability at the end of the year, and that the PV group is each time superior to the A.

TABLE II.

Showing Scores in Number of Hits in the Hammering Test for Both Groups, at the Beginning and End of the Year

	Academic			Prevocational		
	Med.	Av.	P.E.	Med.	Av.	P.E.
1915.....	4	4.7	1.7	6	6.3	2.8
1916.....	3	3.5	1.5	4	4.1	2.1

Considering individual changes, in the A group in 1916, 12 raised, 8 equalled and 28 lowered the records of 1915. In the PV group the corresponding figures are 16, 4 and 41 respectively. Not all of the subjects took this test.

Table III gives the scores in seconds of the three-hole test. In both groups there were altogether 87 subjects who took this test, and of these all except one did slower work in 1916 than in 1915.

TABLE III.

Showing Scores in Number of Seconds in the Three-Hole Test for Both Groups, at the Beginning and End of the Year

	Academic			Prevocational		
	Med.	Av.	P.E.	Med.	Av.	P.E.
1915.....	29	29.0	3.0	28.5	28.8	2.8
1916.....	36	37.1	3.1	37.5	37.9	3.9

Correlations

How much does a subject, relative to the others, resemble himself in the two testings? The correlations are as follows, according to the Spearman foot-rule method.

Thrusting

A 62 subjects. Average r of four speeds, 1915–1916, $= .282$
PV 61 " " " " " " " " $= .356$

Hammering	*Three-Hole*
A 47 subj. 1915–16, $r = .541$	38 subj. $r = .606$ PE .07
PV 61 " " " $r = .486$	48 " $r = .689$ PE .07

In the thrusting and hammering tests the correlations are low. In the three-hole test, however, we are justified in believing that while the performances vary in a definite and uniform way, the variations within the groups are reasonably constant, and the test is a fairly reliable index of ability.

In conclusion, we may say that as far as the tests involved go, there is no improvement in the manual accuracy of Prevocational School boys in work more or less different from the shop work, when the tests are made at the beginning and end of the school year.[2]

The question is at once raised as to the effects of the work of the school year on manual ability. The importance of work in that field, and the scarcity of literature in it, make further investigation highly to be desired.

[2] Individual detailed records in the tests mentioned are available, and the author will be glad to correspond with any persons who are further interested in the work.

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EDITORIALS

MENTAL TESTS AND MILITARY SERVICE

The committee of the American Psychological Association on the examination of recruits, consisting of Drs. Bingham, Goddard, Haines, Terman, Wells, Whipple and Yerkes, met at Vineland, N. J., May 28 to June 13, and considered in detail the contributions that psychologists might make to the efficiency of the new National Army. It was agreed that it would be desirable for the military authorities to pick out those men who on account of illiteracy or foreign birth were unable to read and write English, the intellectually subnormal, the potentially psychotic, and the intellectually superior. To this end tests of various sorts were proposed, and the committee adjourned for a fortnight to enable the individual members to try these tests out. On July 1 the committee reconvened and selected a series of ten tests for group examinations and twenty-one tests to be used in various combinations for individual examinations. The group tests included a "following directions" test, immediate memory for digits, dissected sentences, arithmetical problems, range of information, opposites, selective judgment, sequence of numbers, logical relations, and a discrimination test. The entire series required fifty minutes

to give. The individual tests included the cube construction, clock test, Knox cube imitation, Porteus maze, Dearborn form board, orientational information, uncontrolled association, repeating digits backward, vocabulary, letter lines, dissected sentences, absurdities, controlled association (rimes), likenesses and differences, ingenuity, reproduction of designs, logical memory, comprehension, sentence construction, arithmetical reasoning, and code learning.

Arrangements were then made to give these tests an extensive application in four military camps, the Syracuse Reorganization Camp for regulars, the Fort Benjamin Harrison Camp for the officers' training reserve, the camp at Nashville, Tenn., for state troops, and the Brooklyn Naval Receiving Station for naval recruits. Between three and four thousand group test records were secured and forwarded to a central statistical bureau for scoring, and several hundred individual tests were made. On August 15 a meeting was called at Columbia University to hear a preliminary report of the statistical committee, to consider the reports of the psychological examiners who conducted the tests in the different camps, and to make such revisions and modifications of the tests as seemed desirable. In some of the camps in addition to the tests judgments were secured from officers as to the military efficiency of the men. Each man's name was written on a card and each officer was asked to sort the cards of the men in his company into five piles corresponding to the judgments "very good," "good," "fair," "poor," "very poor." Names with which the officer was not familiar were disregarded. In this way from one to three independent judgments were secured on each man. It is believed that the correlation between these judgments and the results of the tests will be fairly high. It must be remembered, however, that the tests are strictly intelligence tests, while the judgments of the officers may be based on physical appearance, docility, or some other criterion.

In general the attitude of the officers was that of interested curiosity, which frequently changed to hearty approval when pains were taken to explain the ultimate objects of the tests and the probability of a satisfactory selection. The men, throughout, took the tests seriously, and so far as one could determine did their best. So favorable has been the general impression produced by these preliminary tests that the War Department has decided to give the plan a systematic trial in six camps, and commissions have been issued to a number of psychologists to superintend the work.

J. C. B.

NOTES AND NEWS

One phase of Mr. Herbert Hoover's food conservation program is a carefully planned educational campaign to let the people know the exact needs of the country and the manner in which these needs must be met. To get this information into every home it is proposed to utilize the schools. A department of elementary and secondary education has been organized, and a conference of superintendents has been called in Washington to aid in this work. Arrangements have been made to keep the educational press informed as to the status of the work, and in this way it is hoped to enlist the active coöperation of teachers.

Former and present graduate students of the Department of Psychology of Cornell University and a number of his more intimate friends among the faculty met with Professor E. B. Titchener in the Psychological Laboratory on the evening of June 22, to celebrate the completion of twenty-five years of his service to Cornell.

A volume of Studies in Psychology, edited by Professors W. B. Pillsbury, J. W. Baird, and M. F. Washburn, and published by L. N. Wilson at Worcester, Mass., was presented to him on the occasion. The book contains the following papers: E. C. Sanford, *A Letter to Dr. Titchener;* M. F. Washburn, *The Social Psychology of Man and the Lower Animals;* W. B. Pillsbury, *Principles of Explanation in Psychology;* C. G. Shaw, *The Content of Religion and Psychological Analysis;* J. W. Baird, *Memory for Absolute Pitch;* R. M. Ogden, *Some Experiments on the Consciousness of Meaning;* R. H. Gault, *The Sense of Social Unity: A Problem in Social Psychology;* H. C. Stevens, *A Revision of the Rossolimo Tests;* L. R. Geissler, *The Affective Tone of Color-Combinations;* H. M. Clarke, *A Note on Recognition;* H. P. Weld, *Meaning and Process as Distinguished by the Reaction Method;* A. S. Edwards, *The Distribution of Time in Learning Small Amounts of Material;* K. M. Dallenbach, *The Psychology of Blindfold Chess;* C. A. Ruckmich, *Visual Rhythm;* L. D. and E. G. Boring, *Temporal Judgments after Sleep;* C. E. Ferree and G. Rand, *The Selectiveness of the Eye's Achromatic Response to Wave-Length and Its Change with Change of Intensity of Light;* J. N. Curtis, *Tactual Discrimination and Susceptibility to the Muller-Lyer Illusion Tested by the Method of Single Stimulation;* W. S. Foster, *A Bibliography of the Published Writings of Edward Bradford Titchener.*

After the presentation, Professor Titchener responded with some reminiscences of the early days of the Cornell Laboratory, and in conclusion announced that he had declined acceptance of the chair of psychology recently tendered him by Harvard University.

The Bureau of Publications of Teachers College, Columbia University, has recently purchased from the City of Boston the complete supply of the *Report of a Study of Certain Phases of the Public School System of Boston, Mass.*

The new Iowa child research station, established by an enactment of the last legislature, has been organized by the appointment of an advisory board of seven members, under the chairmanship of Professor C. E. Seashore, professor of psychology and dean of the graduate college. The board contains representatives from the college of medicine, the college of dentistry, the department of education, the extension division, the department of home economics, and the department of sociology. Professor Seashore spent the summer at the University of California, lecturing on psychology and on the application of tests for the determination of musical ability in school pupils.

A department of psychology is to be organized at the University of Minnesota. Doctor Robert M. Yerkes has been called from Harvard University to the Chairmanship of the Department. The staff, so far as announced, consists of Professor Yerkes, Associate Professor Herbert H. Woodrow, Assistant Professor Henry T. Moore, Assistant Professor Joseph Peterson, and Instructor K. S. Lashley. The permanent organization of the department may be somewhat delayed by the fact that Professor Yerkes has accepted a commission in the United States army, to direct the development and administration of mental tests in connection with the new National Army recently raised by the draft.

At the Carnegie Institute of Technology Professor W. D. Scott will continue as director of the Bureau of Salesmanship Research throughout the year instead of returning to Northwestern for the first semester as originally planned. Professor G. M. Whipple will have charge of certain phases of the work in mental tests during the first semester, having been granted leave of absence from the University of Illinois. L. L. Thurstone has been promoted to an in-

structorship in psychology, Beardsley Ruml (Ph. D., Chicago) has been made instructor in psychology, and A. J. Beatty (Ph. D., Illinois) has been appointed research assistant in the Bureau of Salesmanship Research. These, with Professors J. B. Miner, Kate Gordon, Edwin A. Lee and W. V. Bingham, Chairman, will constitute the faculty of the Division of Applied Psychology for the coming year.

Mr. H. A. Brown, director of the Bureau of Research, New Hampshire Department of Public Instruction, has been elected president of the Wisconsin State Normal School, at Oshkosh, Wisconsin.

Dr. Frederick Stephen Breed, of the University of Michigan, has been appointed assistant professor of education at the University of Chicago.—*School and Society.*

Dr. Frank Nugent Freeman has been promoted from assistant professor to associate professor of education in the University of Chicago.

At Dartmouth College Charles L. Stone has been appointed instructor in psychology.

At Oberlin College Dr. Edward S. Jones, of Northwestern University, has been appointed assistant professor of psychology; Jacob Speelman, director of athletics at Lawrence College, Appleton, Wis., assistant professor of physical education; and Dr. Carl C. W. Nichol, assistant professor of psychology, acting dean of college men.—*School and Society.*

At the University of Oklahoma H. E. Cunningham, president of Lebanon University, has been elected assistant professor of education.—*School and Society.*

Mr. E. A. Doll, assistant psychologist at the Vineland Training School for Feeble-minded, has accepted a position in the department of psychology at Princeton University.

Mr. Arthur S. Otis, of the graduate department of Stanford University, has been appointed assistant psychologist in the Training School, at Vineland, N. J.

PUBLICATIONS RECEIVED

BIRD T. BALDWIN. *A Study in Mental Retardation in Relation to Etiology.* Reprinted from the Medical Record, January 27, 1917. Pp. 21.

This is a detailed study of a child who suffered a severe attack of cerebro-spinal meningitis in infancy, and who at the age of sixteen is well developed physically but greatly retarded mentally. The author gives a succinct account of the educational efforts that have been made with the boy and the resulting intellectual improvement.

FRANK W. BALLOU. *Arithmetic. Determining the Achievement of Pupils in the Addition of Fractions.* Bulletin Number 7, Department of Educational Investigation and Measurement. Boston Public Schools, 1916. Pp. 28.

Although arithmetic was the first school subject in which scientific measurements were attempted, practically nothing has been done in that subject outside of fundamental combinations of integers. This is the first scientific study of ability to deal with fractions. The bulletin describes the construction of the tests, the plan of the testing, and the significant results. Approximately 1200 pupils were tested in each of Grades VI, VII, and VIII. The author finds that the factors which enter into the problem of adding fractions are much more complex than those involved in the addition of integers. The chief errors occurred in the reduction of fractions to lowest terms or to mixed numbers. The author thinks that the present method of teaching reduction is unsatisfactory and believes that it should be taught in direct connection with addition of fractions. Eight per cent. in Grade VI, eleven per cent. in Grade VII, and five per cent. in Grade VIII, were unable to solve the simplest problems in the addition of fractions.

LEE EMERSON BASSETT. *A Handbook of Oral Reading.* Boston: Houghton Mifflin Company, 1917. Pp. vii, 353.

The central idea of this handbook is that expression is concerned primarily with ideas. Technical drill on vocal exercises, enunciation, and pronunciation are, therefore, put at the end of the book rather than at the beginning. Clear understanding rather than emotional exaggeration is the basis of effective and convincing speech. Part I is devoted to thought getting, and to the voice modulations which indicate well ordered thinking and arouse such thinking in others. The most important factors in thought expression are grouping, by means of pauses and changes of pitch, inflection and pitch variation, and emphasis. Part II deals with imaginative portraiture and the awakening of emotional response. Part III considers the technical aspects of voice production, voice training, enunciation and pronunciation. The book contains a large number of carefully chosen exercises.

KONRAD BERCOVICI. *Crimes of Charity.* New York: Alfred A. Knopf, 1917. Pp. 270. $1.50.

The author presents in easy conversational narrative the first-hand experiences of a worker in organized charity. He firmly believes that organized charity is a great curse hovering like a vampire over its victims and sucking out their life blood of independence, self-respect and honesty. The picture of the ruin wrought by organized charity is a most doleful one, and a part of the tale's tragedy is the fact that the incidents are narrated in such a simple, straightforward fashion that the reader gains the conviction that the incidents may well be quite authentic. It is not that the administrators of organized charity are inhuman beings by nature, but the evil system of which they are the agents debases and demoralizes them until their activities reveal an almost fiendish automatism. Unfortunately the author's attitude is entirely destructive, and he has nothing constructive to offer in place of the institution which he arraigns.

W. V. BINGHAM. *Mentality Testing of College Students.* Reprinted from the Journal of Applied Psychloogy. Vol. I, 1917. Pp. 38, 45.

The author comments on the growing demand for mental tests in college work and advocates the encouragement of new tests, the better standardization of old tests, and the carrying on of coöperative research.

PAUL BJERRE. *The History and Practice of Psychanalysis.* Translated by Elizabeth N. Barrow. Boston: Richard G. Badger, 1917. Pp. 294. $3.00.

This is an extremely interesting book, tracing the development of psychanalysis from Kant and Feuchtersleben to the present day. The book presents a lively account of Wetterstrand and the Nancy school of hypnotism, Freud and the Vienna movement, the Adler doctrine and the deserters from the Freud camp, the nature of hypnotism, the warfare between the advocates of the conscious and the unconscious, the history of an interesting case, and the present outlook of psychology. The author takes issue with the dictum of Bernheim, "There is no hypnosis, there is only suggestion," and considers that there is a distinct place for hypnotic-therapy. Hypnosis is defined as a temporary sinking back into that primary state of rest which obtained during fetal life.

EMILE BOIRAC. *L'Avenir des Sciences Psychiques.* Paris: Librarie Felix Alcan, 1917. Pp. 300. 5 francs.

This book deals not with psychology as an experimental laboratory science, as pursued in this country, but with such phenomena as are detailed in the reports of the Society for Psychic Research—with hypnotism, animal magnetism, thought transference, clair-

voyance, and spiritualism. To ask in solemn fashion to the extent of 300 pages whether it is possible for such extravaganzas to become scientific would seem to be designed either to arouse Homeric laughter or to make one weep at the credulity of human nature. The value of the book lies in the minute and painstaking account of the present status of these pseudo-psychological cults. We turn from the book with the conviction that the French mind moves in devious and incomprehensible channels when the subject of psychology is under discussion.

J. Crosby Chapman and Grace Preyer Rush. *The Scientific Measurement of Classroom Products.* Boston: Silver, Burdett and Company, 1917. Pp. viii, 191.

The volume presents in brief compass some of the more important attempts at devising and applying educational measurements. In Chapter I, the authors compare the various subjective scales used by teachers in estimating the value of school work, such as the 100 per cent. scale, the A, B, C, D, scale, the good-fair-poor scale, etc., with the objective scales which have recently been proposed. Chapter II deals with arithmetic scales, and describes the Courtis Standard Tests, Series A and Series B, and the Woody Arithmetic Scale. In Chapter III (handwriting scales) the Thorndike and the Ayres Scales are reproduce in detail, and the Courtis method of securing samples is described. Chapter IV, on reading scales, gives the Thorndike, the Gray, and the Starch tests, and the Courtis method of scoring reading. Chapter V is devoted to spelling scales, with Buckingham, Starch, and Ayres as representatives. Why the Buckingham word lists are given without their corresponding absolute values is difficult to understand. Chapter VI reproduces the Hillegas Composition Scale entire and the description scale as representative of the Harvard-Newton scales. It is interesting to note that Chapter VII is devoted entirely to the Trabue Completion Test Language Scales, although no norms or standard scores are presented. In Chapter VIII several samples of Thorndike's Drawing Scale are reproduced, though no reference is made to Childs' application of this scale to the drawings of school children. The final chapters, IX and X, deal with the applications of the tests in schools and with certain dangers which should be guarded against in the use of educational scales. An appendix presents a very brief bibliography.

Walter Libby. *An Introduction to the History of Science.* Boston: Houghton Mifflin Company, 1917. Pp. x, 288. $1.50.

"The history of science has something to offer to the humblest intelligence. It is only by teaching the sciences in their historical development that the schools can be true to the two principles of modern education, that the sciences should occupy the foremost place in the curriculum, and that the individual mind in its evolution should rehearse the history of civilization. This book is intended as a simple introduction, taking advantage of the interests of youths

from seventeen to twenty-two years of age in order to direct their attention to the story of the development of the sciences. It is therefore a psychological introduction, having the mental capacity of a certain class of readers always in view, rather than a logical introduction, which would presuppose in all readers both full maturity of intellect and considerable initial interest in the history of science." The book is written in fascinating style and is to be heartily commended for use in high schools and colleges. Each chapter is followed by a selected bibliography.

CHRISTABEL M. MEREDITH. *The Educational Bearings of Modern Psychology.* Boston: Houghton Mifflin Company, 1917. Pp. 143. Sixty cents.

This is a book on instinct and habit in their relation to education. The author is an English writer and holds to the conception of instinct made familiar by the social psychology of McDougall. Instincts are presented as definite entities which ripen at different times and either disappear or are modified into habits. It is a pity that the concept of instinct has secured such a hold upon educational psychology. It is a purely metaphysical creation, with at best a tenuous factual basis, and on this account it lends itself beautifully to psychological and educational theorizing. Actual analysis of behavior, however, as Thorndike has shown, reveals a degree of complexity that leaves no dividing line between instinct and habit. All behavior of whatever sort goes back to the basis of inherited nervous structure, while there is no phase of school behavior that has not been profoundly modified by habit formation. To recent experimental studies with mental tests or to the development of educational measurements the book contains not a single reference.

RUDOLF PINTNER AND DONALD G. PATERSON. *A Scale of Performance Tests.* New York: D. Appleton and Company, 1917. Pp. x, 218. $2.00.

This attractive and well constructed book brings together widely scattered material, and presents the results of original investigations on a new aspect of the study of intelligence. The Binet-Simon tests and other information tests have attracted a great deal of attention and have been of great service in indicating mental defect or superiority. But, as Ayres and others have insisted, these tests do not take sufficient account of those who are able to *do* things rather than to *talk about* them. The authors here present fifteen performance tests. The methods used in standardizing these and the data derived from their application to children from the ages of four to sixteen are given in detail. From these data the authors construct a scale similar in some respects to the Binet scale. This is followed by chapters on the median mental age, the Yerkes-Bridges Point Scale, and tables giving the percentile distributions of the scores in each test. It is to be hoped that the book will stimulate interest in and the use of these tests with children of normal and superior mental ability.